

REMARKS

This application, as amended herein, contains claims 1-14 and newly added claims 15 - 20. An obvious error in the specification has been corrected.

Applicants thank the Examiner for the indication of the allowability of claims 14.

Claims 1-6 were rejected under 35 U.S.C. 102(e) as anticipated by Kim. Claims 7-11 were rejected under 35 U.S.C. 102(e) as anticipated by Yanagawa et al. Claims 12 and 13 were rejected under 35 U.S.C. 102(e) as anticipated by Komatsu. These rejections are respectfully traversed.

The nature of applicants' invention may be appreciated by reference to Fig. 2B and to Fig. 4, where the pixel electrode 18 is shown as having a first electrode portion and a second electrode portion separated from one another by an insulating layer, but electrically connected to one another. This structure has the unique advantage of shielding the pixel from the electric field generated by the data or signal line 15, and thus prevents an undesirable adverse influence on the orientation of the liquid crystal molecules by the electric field of the lines 15. As demonstrated below, the art of record does not teach or suggest this nature of this problem or its solution as set forth in the claims. For the specific reasons set forth below, it is respectfully submitted that the claims are directed to patentable subject matter.

The rejection of claim 1

The Examiner has stated that the pixel electrode of Kim comprises a first electrode 720 and a second electrode 40, electrically connected to each other through insulating layer 80 by contact 810. However, a brief review of Kim discloses that while electrode 40 is a pixel electrode, electrode 720 is a drain electrode (see Kim, column 3, lines 12- 13). Electrode 720 does not function as a pixel electrode, because the electric fields that drive the pixels are developed between the respective pixel electrodes 40 and the common electrodes 310, as specifically shown by the curved arrow in Fig. 2. If fact, having any part of drain electrode 720 provide an electric field to the pixel would result in a field direction not consistent with the direction of the curved arrow and would have a deleterious effect on the operation of the pixel. Thus, Kim does not meet all of the limitations of claim 1. Specifically, Kim does not disclose or suggest a pixel electrode having first electrode and a second electrode, electrically connected to each other through an insulating layer. It is therefore respectfully submitted that the rejection of claim 1 is incorrect and should be withdrawn, as Kim neither anticipates nor renders obvious claim 1, and thus claim 1 is directed to patentable subject matter.

The rejection of claim 2

The same remarks that apply to the rejection of claim 1 also apply to the rejection of claim 2. Specifically, Kim does not disclose or suggest pixel electrodes provided

with a first electrode arranged in the same layer as the common electrodes and a second electrode arranged in the same layer as the signal lines, the second electrode being electrically connected to the first electrode. For the reasons noted above with respect to claim 1, it is submitted that electrode 720 is not a pixel electrode, but instead is a drain electrode. It is thus submitted that claim 1 is not anticipated or rendered obvious by Kim.

The rejection of claim 3

This rejection appears to have an error therein as the reference numeral 30 is used for two different elements. However, it is assumed that the Examiner meant to say that the common electrode of Kim comprises a common line 30, which overlaps signal line 70 in the thickness direction of the display. However, even this statement is simply wrong. Common line 30 of Kim is no more a common electrode than is drain electrode 720. Common line 30 of Kim simply serves as an interconnecting wire that supplies a common potential to the common electrodes 310. Again, since the electric field which influences the direction of orientation of the liquid crystal display molecules follows the path illustrated by the curved arrow between common electrode 310 and pixel electrode 40 in Fig. 2 of Kim, common line 30 can not be considered as an common electrode. If it were, and did supply an electric field to the pixel, it would be in the wrong direction, and would have a deleterious effect on the displayed image, because the liquid crystal molecules in its vicinity would be oriented in the wrong

direction. Thus, it is respectfully submitted that claim 1 is not anticipated or rendered obvious by Kim.

The rejection of claim 4

It is respectfully submitted that this rejection should be withdrawn for essentially the same reason as that stated above with respect to the rejection of claim 1. Element 720 of Kim is not a pixel electrode.

The rejection of claim 7

Claim 7 recites "shield electrodes provided in positions closer to said signal lines than said pixel electrodes, said shield electrodes being set at potentials electrically equal to those of said pixel electrodes." The examiner has asserted that with respect to Yanagawa et al., "Pixel electrode 5 contains horizontal portions formed over counter voltage line 4. These portions are considered to be shielding electrodes." However, this assertion is simply wrong. First there is no specific teaching in Yanagawa et al. that this is the purpose of these portions, or that they serve this function. Quite to the contrary, these portions of pixel electrode 5 are used to form a capacitor Cadd, as clearly shown in Fig. 1. Second, the alignment of the liquid crystal molecules is determined by the voltage difference between the pixel electrode 5 and the counter-electrode 4A, and the resulting electric field in the direction of the vector E in Fig. 1 of Yanagawa et al. Thus, there is no reason to provide a shield at the region between the upper pixel and the lower pixel, because

no liquid crystal molecules are being influenced by that portion of the horizontal extension of the pixel electrode in Yanagawa et al. Finally, even if these portions of pixel electrode 5 were to provide some kind of shielding function (which it is asserted they do not), it would be an extremely poor function, as these horizontally extending portions of the pixel electrode 5 of Yanagawa et al. do not extend along the direction of the active pixel area, so there would be no shielding offered in an event.

In view of the above, it is respectfully submitted that claim 7 is neither anticipated nor rendered obvious by Yanagawa et al.

The rejection of claim 12

In the rejection of claim 12, the Examiner has stated with respect to Komatsu, that "The common bus line 103 is considered a shield portion since it would perform some form of electrical shielding." However, claim 12 recites "shield portions for shielding the electric fields from said signal lines." This is desirable so that the electric field produced by the signal line does not influence the orientation of liquid crystal molecules in the pixels and thus have a deleterious effect on the image displayed.

While the Examiner has referred to Figs. 2a, 2b and 2c of Komatsu, the Examiner has failed to see the big picture of what is actually happening in Komatsu. By referring to Fig. 5, the Examiner will note that the common bus lines 103 run horizontally, while the signal or data lines 102

run vertically, in a direction perpendicular to the common bus lines 103. It is therefore impossible for the common bus lines 103 to provide shielding of electric fields from the signal lines, as specifically required by claim 12. Further, it is the potential difference between the voltage on the common bus line 103, as applied to the common electrodes 109, and the data or signal voltage applied to the pixel electrodes 108 that produces the electric field which influences the orientation of the liquid crystal display molecules, and allows the display to operate. To provide shielding in the structure of Komatsu would defeat this purpose. Finally, there is no teaching or suggestion in Komatsu that there is any shielding purpose or function of any kind whatsoever with respect to the common bus lines 103. Thus, it is respectfully submitted that the rejection of claim 12 should be withdrawn.

The rejection of claim 13

Claim 13 states that the pixel electrodes overlap the shield portions in a thickness direction of the display panel. As noted with respect to claim 12, from which claim 13 depends, the common bus line 103 does not serve as a shield for electric field from the signal lines, as specifically required by claim 12. Thus, it is submitted that claim 13 is also directed to patentable subject matter.

The original claims not mentioned above depend from one of independent claims 2 or 7. These claims recite further elements which, in combination with the elements

set forth in independent claim 2 or 7, are not disclosed or suggested in the art of record. For the reasons set forth above with respect to claims 2 and 7, it is submitted that the remaining dependent claims are also directed to patentable subject matter.

Newly added claims 15 and 16 depend from claim 1. Newly added claims 17 and 18 recite the same relationships as claims 15 and 16, but depend from independent claim 2. Newly added claims 19 and 20 depend from independent claim 7. These claims serve to further distinguish Applicants' invention from the art of record.

Support for claims 15 - 18 may be found, for example, in the specification in the first full paragraph on page 10 and in the sentence at the end of the last full paragraph on page 12, and in the drawings. As noted in the latter, the placement of the common electrode immediately above the gate lines and the signal lines has the advantage of eliminating reduction in the aperture size of the pixels, providing a better display.

Support for claims 18 and 19 may be found in Fig. 2B and in the description thereof, including that of the related figures, on pages 9 to 11 of the specification. The particular arrangements of elements set forth in claim 18 and 19 are not taught or suggested by the art of record.

In addition, in view of the indication of allowability of claim 14, claim 18 is clearly directed toward patentable subject matter.

Thus, reconsideration and allowance of this application is respectfully requested. In view of the allowable nature of the subject matter of all of the claims, if the Examiner cannot issue an immediate allowance, it is respectfully requested that the Examiner contact the undersigned to resolve any remaining issues.

Respectfully submitted,

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Date

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AUGUST 25, 2003

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David Aker

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